SI Materials and Methods

PC12 Neurite Outgrowth Assay. PC12 cells were plated at a density of ≈4000 cells per well in a 96-well plate precoated with poly- d-lysine. The normal culture medium was replaced with DMEM containing a minimal level of serum (1% FCS) and supplied with various concentration of NGF, biotinylated NGF (BtNGF) or QD-NGF. Neurites were measured 48 h after plating, using a phase-contrast microscope coupled with a ×100 objective. Five fields, each containing ≈100 cells, were randomly selected. The percentage of the cells bea ring neuritic processes of >2 cell diameter was measured for each sample. Cells in clusters were not counted.

Data Analysis.
On average, the fluorescence signal from a single endosome spans to an area of 5 by 5 pixels on the digitized i mage. After background subtraction, the endosomes were identified as the local maxims whose fluorescence intensity was at least three times above the background noise. Spatial distribution o f the fluorescence intensity of individual endosomes was fitted to a two-dimensional Gaussian function. The fitted center, corresponding to the position of the endosome, was locate d with a precision of 10-20 nm. After measuring the position of endosomes at consecutively timed images, the trajectories were constructed by linking the time-resolved endosome positions. The average speed was determined by measuring the distance the endosome traveled over the observation time. Endosomes containing a single QD were identified by the blinking events dur ing the period of observation. The fluorescence intensity of each endosome was measured by integrating the total fluorescence within a 5-pixel diameter circle centered on the endosome.